

**ATRIPLEX SUBTILIS (CHENOPODIACEAE): A NEW SPECIES
FROM SOUTH-CENTRAL CALIFORNIA**

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ABSTRACT

Atriplex subtilis, sp. nov., is a newly described species from south-central California. It is a short-statured, fine-textured, diploid annual, with opposite leaves and branches. Its leaves are small (ca 2–4 mm long, 1.5–3 mm wide), cordate and sessile. It is morphologically most like *A. depressa* Jepson but differs from *A. depressa* in several characteristics, including shape of fruiting bracts (deltoid instead of rhomboid), position and arrangement of fruiting-bract appendages (both sides instead of adaxial side only), more slender stems, and longer internodes. *A. subtilis* is confined to south-central California, mostly in Tulare, Fresno, Kern, and Kings counties; *A. depressa* occurs in more northerly latitudes, primarily in Glenn and Yolo counties.

***Atriplex subtilis* Stutz & G.L. Chu, sp. nov. (Fig. 1). --TYPE:**
USA, California, Kings Co., 12 miles W of Tulare, SE corner
of Kansas Avenue and 6th Avenue, T20S R22E S4, 30 Aug.
1994, *H. C. Stutz 9654* (holotype, BRY).

Herba annua, 10–30 cm alta. Caulis erectus, multi-ramosus; rami graciles, teres, absque striaque costis; medii et inferi ramuli fere oppositi, oblique patuli, saepe purpureo-rubelli, dense furfuracei, internodiis 5–15 mm longis, 0.6–1.2 mm diam. Folia sessilia, plerumque fere opposita, ovato-deltaeidea usque lato-ovata, polio-viridia, 2–4 mm longa, 1.5–3 mm lata, saepe patentia, apice obtusa, base cordata, amplexicaulia, integra, utrinque dense fufuracea. Staminales et pistillati flores mixti in glomerulos, axillares ad lotos ramos; perianthium staminalis floris depresso-globosum, 1–1.5 mm diam., plerumque 4- raro 5-partium usque prope basin; segmenta ovata ca. 1 mm longa, membranacea, leviter carnosa dorsaliter prope apices; stamina tot quot segmenta perianthiorum, filamentis ca. 1.5 mm longis et oblongis antheris 0.3–0.5 mm longis. Fructiferae bractae sessiles, deltaeidae ca. 3 mm longae and latae, apice brevi-acuminatae, margine 1–3 paribus dentium, basale par dentium saepe magnius et deorsum patens, plerumque utrinque distichis longitudinaliter tuberculiformibus appendicibus. Utriculus suborbicularis, ca. 1.2 mm diam., membranceo pericarpio. Semen atro-brunneum duro perispermio, radícula supera.

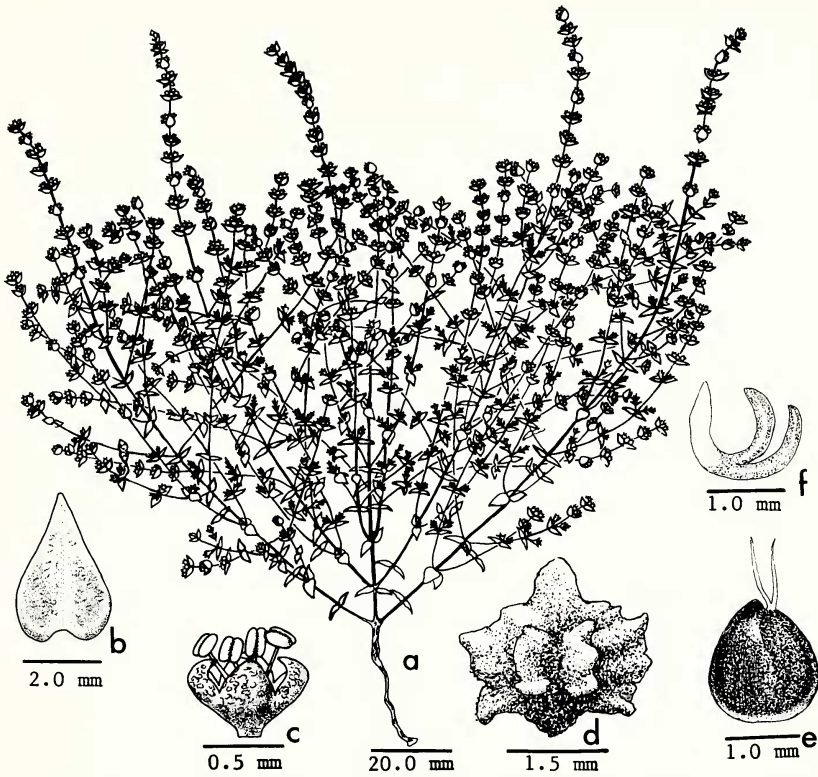


FIG. 1. *Atriplex subtilis*. a. Habit. b. Leaf. c. Male flower. d. Fructing-bract. e. Utricle. f. Embryo. (Drawings of a,b,c by Loretta Orgill; d,e,f by Marcus A. Vincent.)

Annual herb, 10–30 cm tall. Stem erect, much-branched, slender, terete, 0.6–1.2 mm in diam., not ribbed nor striate; branchlets opposite, occasionally alternate in upper branchlets, oblique-spreading, usually purple-reddish, densely furfuraceous; internodes 5–15 mm long. Leaves sessile, mostly opposite, ovate-triangular to broad-ovate, 2–4 mm long, 1.5–3 mm wide, mostly clasping and spreading, grey-green, apex obtuse, base cordate, entire, densely furfuraceous on both surfaces; Kranz-type venation. Male and female flowers mixed in glomerules, axillary throughout nearly all branches; perianth of staminate flowers depressed-globose, 1–1.5 mm in diam., usually 4-parted, rarely 5-parted to near base, segments ovate, ca. 1 mm long, membranaceous, slightly fleshy dorsally, near apex; stamens as many as perianth segments, filaments ca. 1.5 mm long, slightly exerted in flowering, anthers orange-red, short-oblong, 0.3–0.5 mm long; rudimentary pistil columnar; fructing bracts sessile, deltoid, ca. 3 mm long and wide, apex short-acuminate, margin ir-

regular with 1–3 pairs of teeth, the two basal marginal teeth usually larger and downward spreading, with 2 longitudinal rows of tuberculate appendages on both surfaces of bracts or rarely, only on adaxial surface. Utricle suborbicular, ca. 1.2 mm in diam., pericarp membranaceous. Seed dark-brown, with solid perisperm; radicle superior.

Chromosome number: $2n=18$ (determined from anthers fixed and stored in 5% acetic acid and squashed in aceto-carmin stain).

Flowering and fruiting period: August–October.

Paratypes. USA, California, Fresno Co.: 8 mi W of Karman, 10 Aug 1937, *R. F. Hoover 2655* (UC); State highway 180, 0.6 mi E of junction of road southward to Jameson siding and Tranquility, 9 Nov 1962, *R. Bacigalupi & L. R. Heckard 8776* (UC, RM). Kern Co.: 10 mi W of Shafter, 29 Aug 1989, *H. C. Stutz 95144* (BRY); 10 mi W of Shafter, Lerdo Highway, then S $\frac{1}{4}$ mile, 28 Aug 1994, *H. C. Stutz 9649* (BRY); Rowlee Rd., 1 mi N of Lerdo highway, 5 Aug 1995, *H. C. Stutz 9783* (BRY). Madera Co.: 4 mi SW of Chowchilla, 1 Oct 1936, *R. F. Hoover 1613* (UC). Merced Co.: 12 mi E of Dos Palos on Chowchilla Road, 11 Oct 1921, *H. M. Hall 11756* (UC); El Nido, 1 Oct 1936, *R. F. Hoover 1597* (UC). Tulare Co.: Visalia, Oct 1881, *Jepson* (CAS); Goshen, about R.R. station, 1 Sep 1905, *K. Brandegee* (UC); 40-acre vernal pool area, $\frac{1}{4}$ mi N of Ave. 104, Road 124, 3 Aug 1963, *E. McClintock* (CAS); 40-acre pool area near Pixley, $\frac{1}{4}$ mi N of Ave. 104, Road 124, Sep 1963, *J. Zaninovich* (CAS); vernal pool natural area in Valley Grassland, about 4.5 miles east–northeast of Pixley, 21 Sep 1967, *J. T. Howell* and *G. H. True 44006* (CAS); 4 mi N of Earlimart, 8 Aug 1971, *J. Zaninovich* (CAS); 3 mi E of Earlimart, 11 Jul 1975, *J. Zaninovich* (CAS); Earlimart, 28 Aug 1989, *H. C. Stutz 95143* (BRY); 2 mi W of Earlimart, 27 Apr 1992, *H. C. Stutz 95622* (BRY); 1 mi W of Earlimart, 2 Sep 1993, *H. C. Stutz 95921* (BRY); 3 mi W of Earlimart, 28 Aug 1994, *H. C. Stutz 9647* (BRY); 5 mi W of Earlimart, 5 Aug 1995, *H. C. Stutz 9787* (BRY); 3 mi S of Pixley on Airport Road, 5 Oct 1995, *H. C. Stutz 9841* (BRY).

Taxonomic relationships. *Atriplex subtilis* appears to be most closely related to *A. depressa* Jepson. They are both small-statured, somewhat obscure annuals with fine-textured stems, opposite branching and opposite sessile, cordate leaves. They differ in the shape of their fruiting bracts (deltoid in *A. subtilis*, rhomboid in *A. depressa*), position of fruiting bract appendages (on both surfaces of the fruiting bracts in *A. subtilis*, on adaxial side only in *A. depressa*), stem diameter (0.5–1.5 mm in *A. subtilis*, 1.0–2.0 mm in *A. depressa*), and internode length (20–30 mm in *A. subtilis*, 10–20 mm in *A. depressa*). They both often show red-purple stem pigmentation, but it is more common and more intense in *A. subtilis*

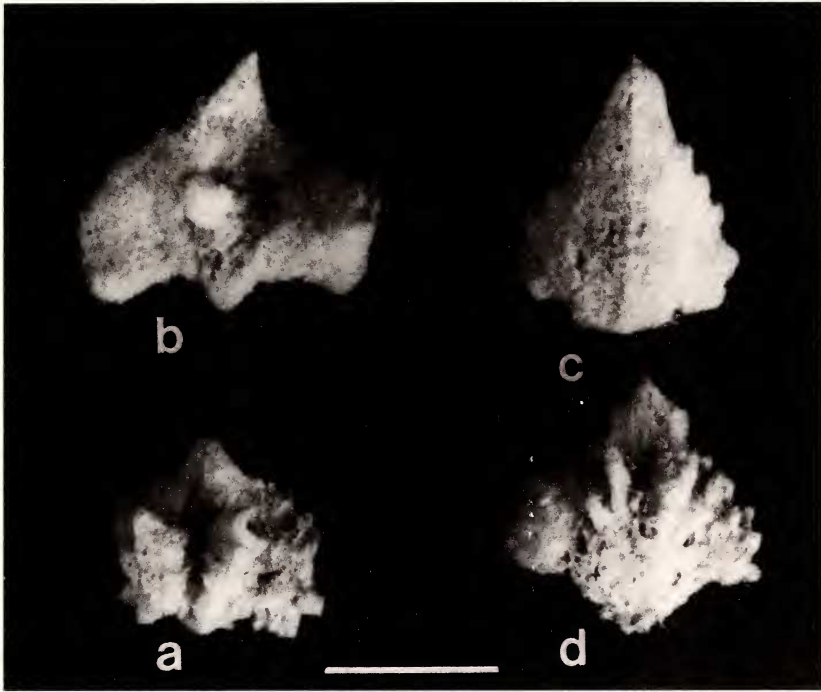


FIG. 2. Fruiting bracts of *Atriplex subtilis* and its near relatives. a. *Atriplex subtilis*. b. *Atriplex miniscula*. c. *Atriplex parishii*. d. *Atriplex depressa*. Bar = 2 mm.

than in *A. depressa*. *A. subtilis* occurs mostly in Fresno, Kern, Kings, and Tulare counties, California; *A. depressa* is restricted to more northerly latitudes, primarily in Glenn and Yolo counties.

Other near relatives of *A. subtilis* appear to be *A. parishii* Watson and *A. miniscula* Standley. Standley (1916) and Hall and Clements (1923) describe *A. parishii* as having alternate leaves. However the type (isotype) specimen (*S. B. and W. F. Parish 1119*, CAS), and plants collected in the field, 2 miles SE of Hemet, Riverside County, California, (*Stutz 9693*, BRY, and *9773*, BRY), and plants grown in the nursery at Brigham Young University, Provo, Utah (*Chu 9851*, BRY) from seed collected from plants in the Hemet population, all show mostly opposite leaves. As with *A. subtilis*, some of the upper branches of *A. parishii* plants have occasional alternate leaves but the lower leaves and branches are always opposite. *Atriplex miniscula* plants always have alternate branching.

Atriplex parishii is also distinguished from *A. subtilis*, *A. miniscula*, and *A. depressa* by its prostrate growth habit and pilose stems and fruiting bracts.

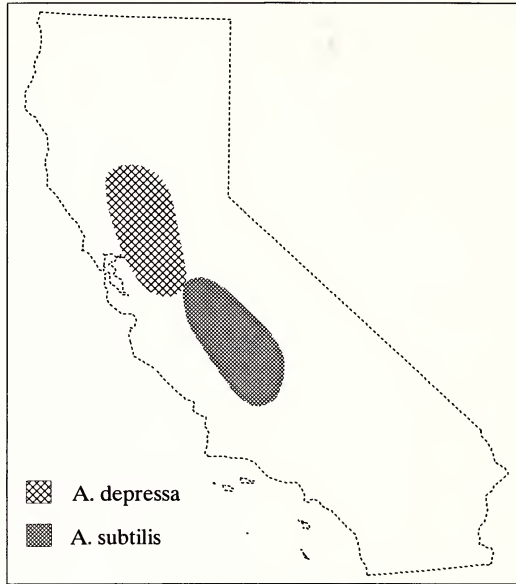


FIG. 3. Geographic distribution of *Atriplex subtilis* and *Atriplex depressa*.

KEY FOR *ATRIPLEX SUBTILIS* and its Near Relatives

1. Branches and leaves all alternate. *A. minuscula*
- 1'. Branches and leaves mostly opposite.
2. Stems prostrate; fruiting bracts unappendaged, pilose. *A. parishii*
- 2'. Stems erect; fruiting bracts with appendages, not pilose.
3. Leaves 2–4 mm long; each side of fruiting-bracts with 2 longitudinal rows of tuberculate appendages, fruiting-bracts near truncate at base.
 *A. subtilis*
- 3'. Leaves 3–7 mm long; fruiting-bract appendages not in rows, on abaxial surface only, fruiting-bracts near cuneate at base. *A. depressa*

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LITERATURE CITED

- HALL, H. M. and F. E. CLEMENTS. 1923. The phylogenetic method in taxonomy. Carnegie Inst. of Wash. Publication No. 326
- STANDLEY, P. C. 1916. Chenopodiales. North American Flora 21(1). New York. New York Botanical Garden.